

## SUPPLEMENT TO

# UNRAVELING THE RUPTURE PROPERTIES OF FOUR DESTRUCTIVE EARTHQUAKES IN TÜRKİYE (1966-1975)

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The supplement includes five additional figures (Figs. S1-S5) and four supplementary tables (Tables S1-S4) with their captions.

Supplementary Figures

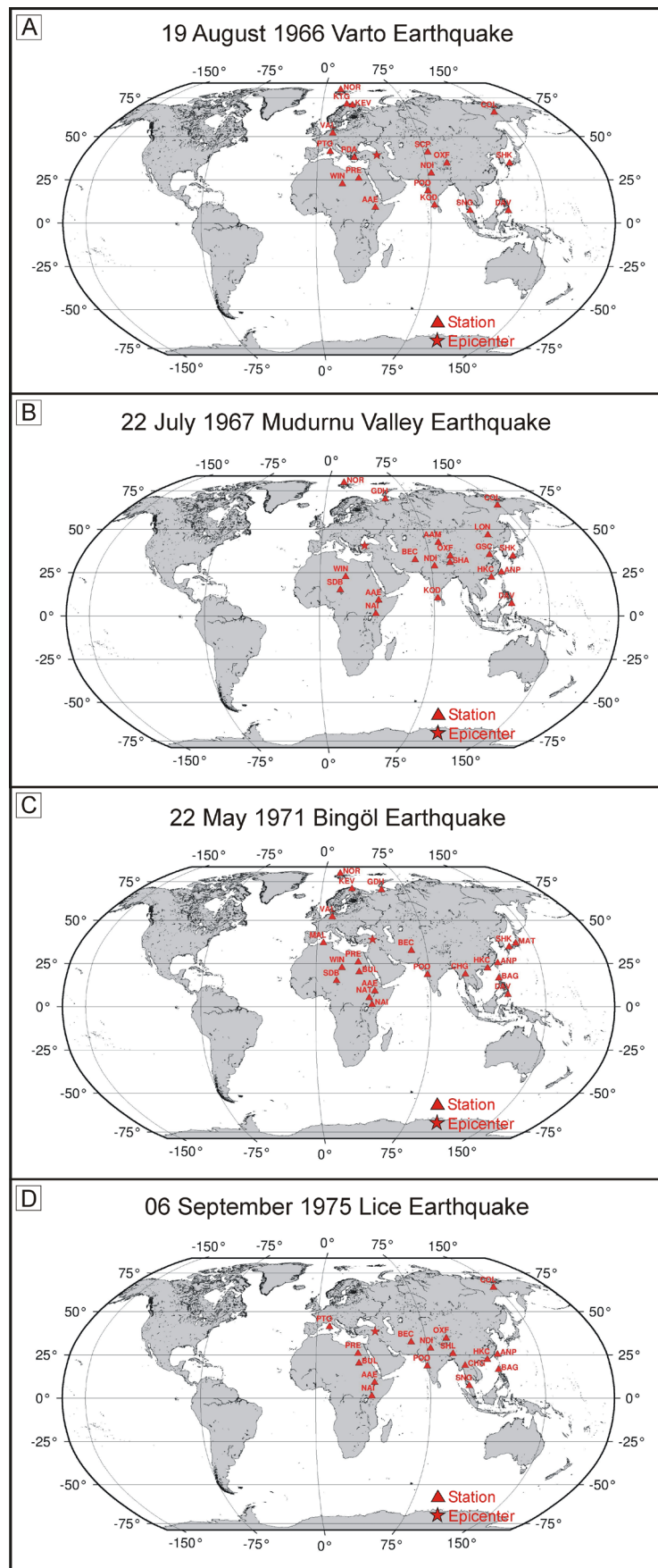
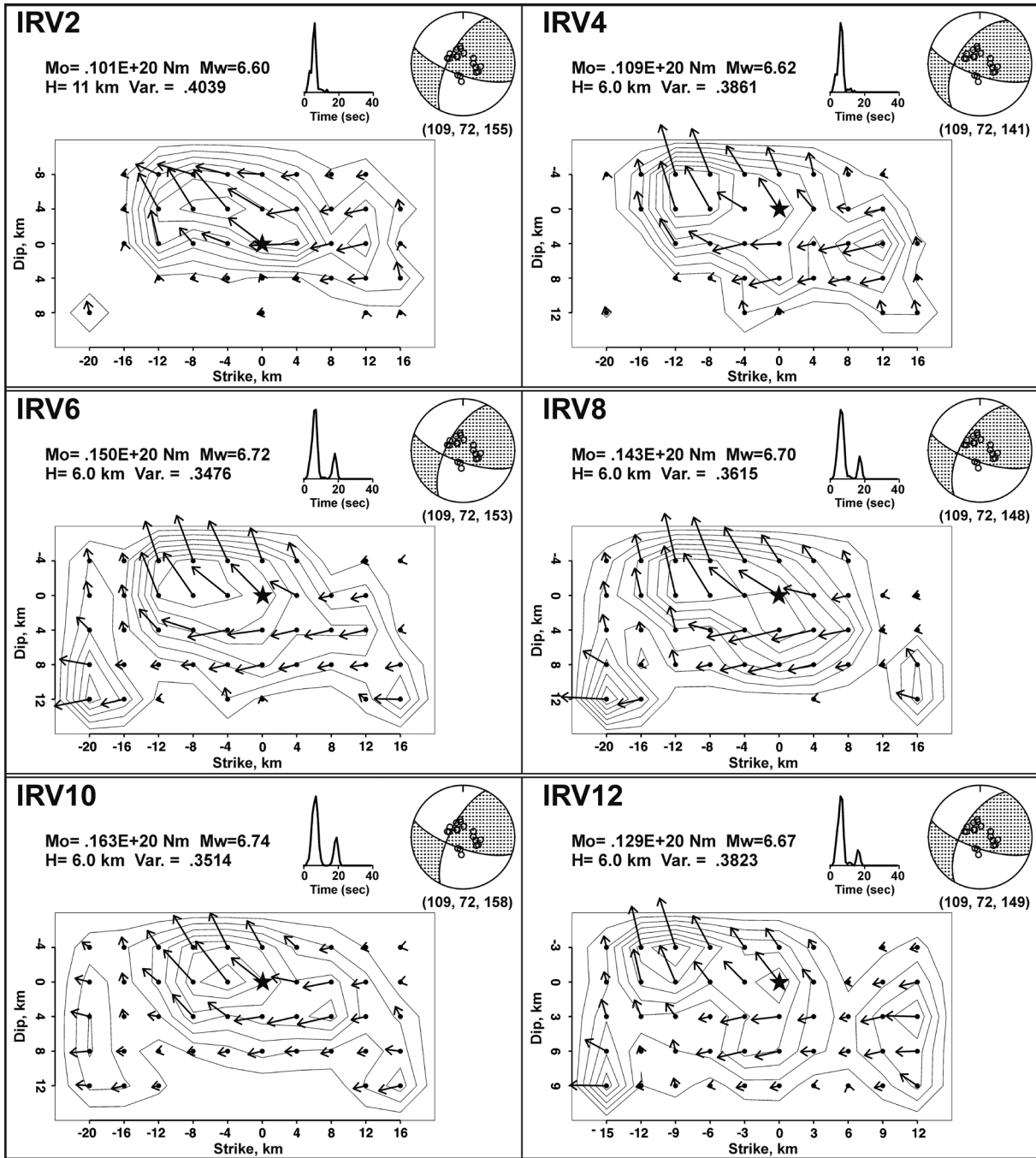
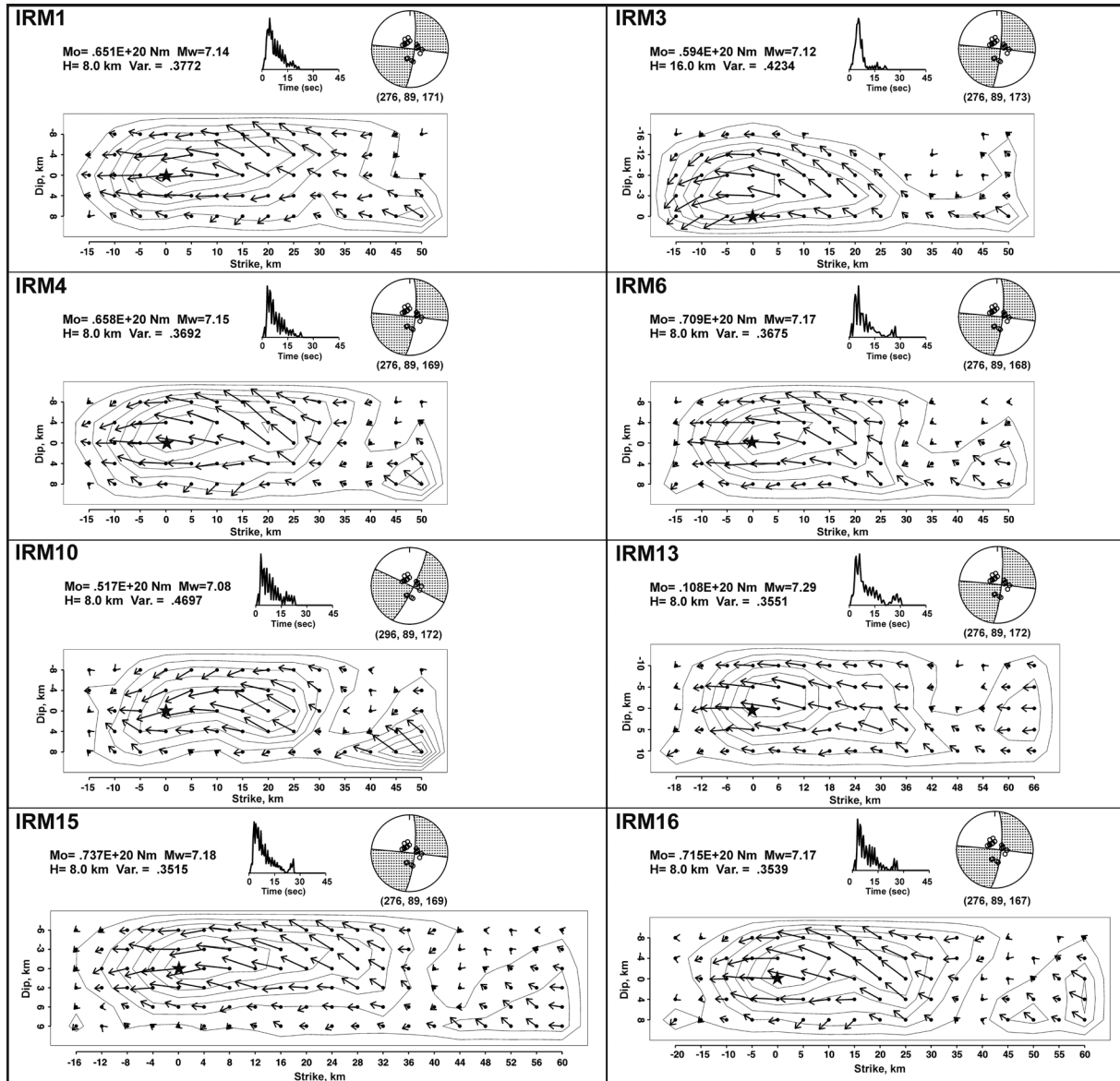


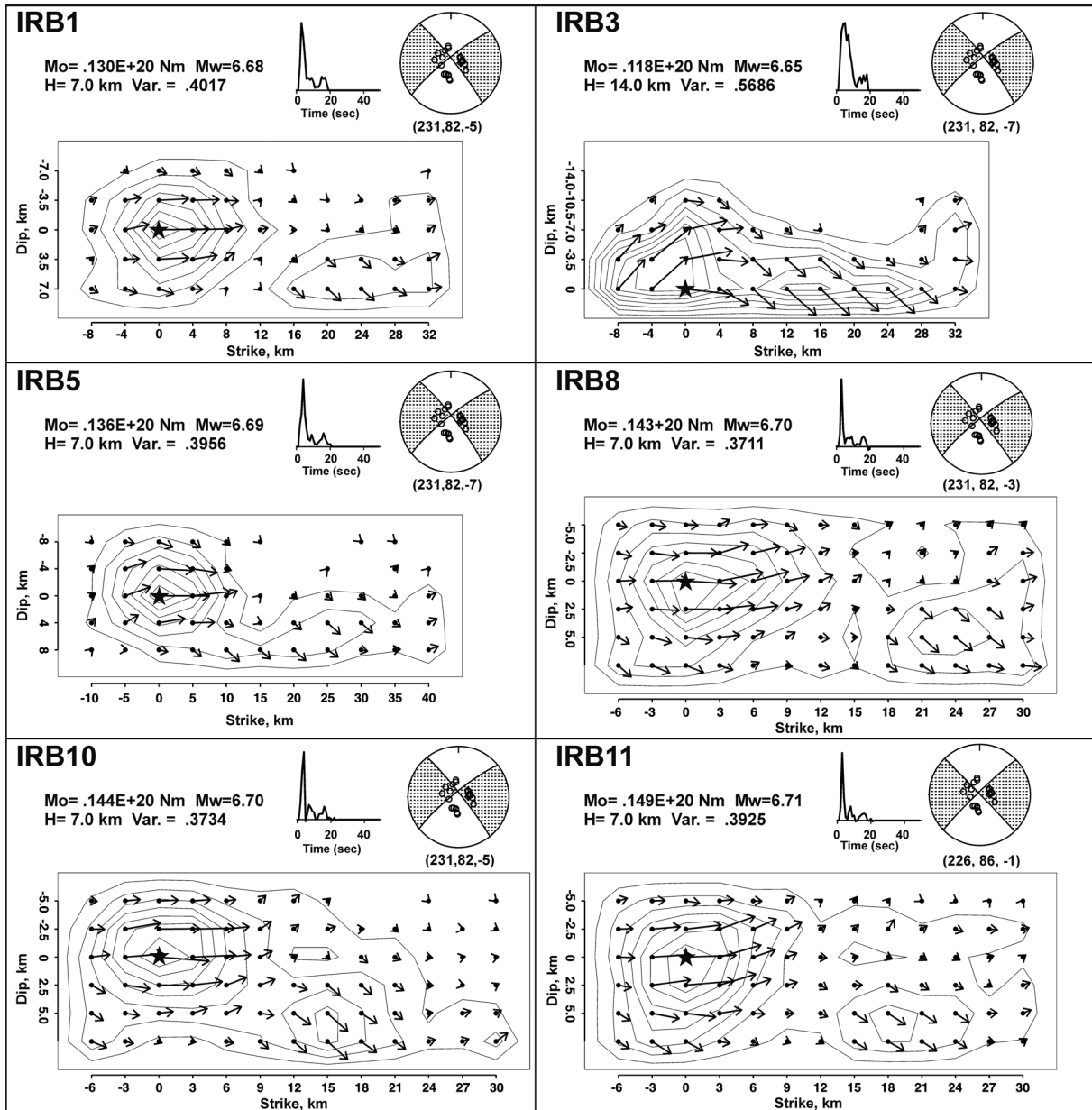
Figure S1. Station names and locations used in the inversion for the studied earthquakes.



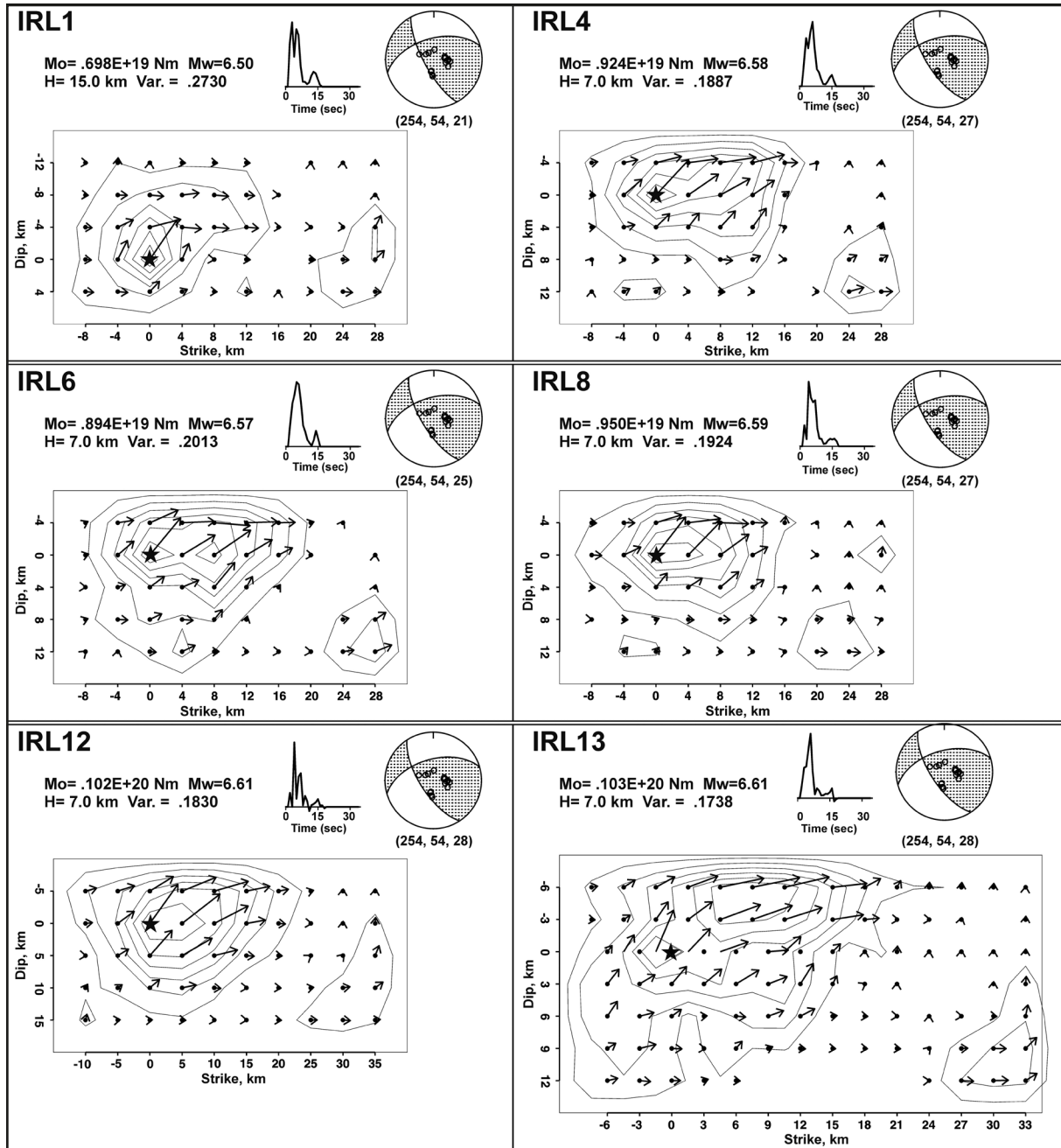
**Figure S2.** Selected inversion results from numerous inversions performed for the 1966 Varto earthquake. Each panel shows the source-time function, focal mechanism, and slip distributions obtained for the labeled models. See Table S1 for the parameters used in each model.



**Figure S3.** Selected inversion results from numerous inversions performed for the 1967 Mudurnu Valley earthquake. Each panel shows the source-time function, focal mechanism, and slip distributions obtained for the labeled models. See Table S2 for the parameters used in each model.



**Figure S4.** Selected inversion results from numerous inversions performed for the 1971 Bingöl earthquake. Each panel shows the source-time function, focal mechanism, and slip distributions obtained for the labeled models. See Table S3 for the parameters used in each model.



**Figure S5.** Selected inversion results from numerous inversions performed for the 1975 Lice earthquake. Each panel shows the source-time function, focal mechanism, and slip distributions obtained for the labeled models. See Table S4 for the parameters used in each model.

## Supplementary Tables

**Table S1.** Inversion trials carried out for the August 19, 1966 Varto earthquake. The results are shown for the selected solutions in Fig. S2.

Model	Strike (°)	Dip (°)	Rake (°)	Vr km/s	SRT (s)	TW-Lag	RD (km)	PSG		Var.	Mo 10 <sup>19</sup> (Nt.m)	Mw	AR (°)	MS (m)
								Along strike	Along depth					
IRV1	298	65	144	3.0	1.0-1.0	5-1.0	11	6/10 4 km	3/5 4 km	0.6801	0.796	6.53	159	2.56
IRV2	109	72	148	3.0	1.0-1.0	5-1.0	11	6/10 4 km	3/5 4 km	0.4039	1.01	6.60	155	1.77
IRV3	109	72	148	3.0	1.0-1.0	5-1.0	16	6/10 4 km	4/5 4 km	0.4620	0.958	6.59	168	2.30
IRV4	109	72	148	3.0	1.0-1.0	5-1.0	6	6/10 4 km	2/5 4 km	0.3861	1.09	6.62	141	1.79
IRV5	109	72	148	3.0	1.5-1.5	5-1.5	6	6/10 4 km	2/5 4 km	0.3778	0.95	6.59	146	1.55
IRV6	109	72	148	3.0	2.0-2.0	5-2.0	6	6/10 4 km	2/5 4 km	0.3476	1.50	6.72	153	1.96
IRV7	109	72	148	3.3	2.0-2.0	5-2.0	6	6/10 4 km	2/5 4 km	0.3663	1.45	6.71	151	1.96
IRV8	109	72	148	3.5	2.0-2.0	5-2.0	6	6/10 4 km	2/5 4 km	0.3615	1.43	6.70	148	1.86
IRV9	109	72	148	2.7	2.0-2.0	5-2.0	6	6/10 4 km	2/5 4 km	0.3504	1.60	6.74	156	2.78
IRV10	109	72	148	2.5	2.0-2.0	5-2.0	6	6/10 4 km	2/5 4 km	0.3514	1.63	6.74	158	2.51
IRV11	109	72	148	3.0	2.0-2.0	5-2.0	6	6/10 5 km	2/5 5 km	0.3458	1.63	6.74	155	1.93
IRV12	109	72	148	3.0	2.0-2.0	5-2.0	6	6/10 3 km	2/5 3 km	0.3823	1.29	6.67	149	3.41
IRV13	109	72	148	3.3	2.0-2.0	5-2.0	6	6/10 5 km	2/5 5 km	0.3485	1.59	6.73	152	1.65
IRV14*	109	72	148	3.0	2.0-2.0	5-2.0	6	6/10 5 km	2/5 5 km	0.3870	1.59	6.73	153	1.88

Vr: Rupture velocity, SRT: Rise-fall durations of slip rise-time function, TW-Lag: number of time window-time lag of the next time window, RD: Reference depth, PSG: reference/number and interval of point sources in point-source grid, Var.: Variance, Mo = Seismic Moment, AR: Calculated average rake angle, MS: maximum slip.  
\* Same as the Model IRV11 but crustal velocity model is from Zor et al. (2003).

**Table S2.** Inversion trials carried out for the July 22, 1967 Mudurnu Valley earthquake. The results are shown for the selected solutions in Fig. S3.

Model	Strike (°)	Dip (°)	Rake (°)	Vr km/s	SRT (s)	TW-Lag	RD (km)	PSG		Var.	Mo 10 <sup>19</sup> (Nt.m)	Mw	AR (°)	MS (m)
								Along strike	Along depth					
IRM1	276	89	-178	3.3	0.8-0.8	4-0.8	8	4/14 5 km	3/5 4 km	0.3772	6.51	7.14	171	4.05
IRM2	276	89	-178	3.3	0.8-0.8	4-0.8	12	4/14 5 km	4/5 4 km	0.3918	6.34	7.13	171	4.64
IRM3	276	89	-178	3.3	0.8-0.8	4-0.8	16	4/14 5 km	5/5 4 km	0.4234	5.94	7.12	173	4.85
IRM4	276	89	-178	3.0	0.8-0.8	4-0.8	8	4/14 5 km	3/5 4 km	0.3692	6.58	7.15	169	4.02
IRM5	276	89	-178	2.7	0.8-0.8	4-0.8	8	4/14 5 km	3/5 4 km	0.3679	6.63	7.15	169	4.78
IRM6	276	89	-178	2.4	0.8-0.8	4-0.8	8	4/14 5 km	3/5 4 km	0.3675	7.09	7.17	168	4.92
IRM7	276	89	-178	3.0	0.8-0.8	4-0.8	8	6/14 5 km	3/5 4 km	0.3805	6.24	7.13	169	4.00
IRM8	276	89	-178	3.0	0.8-0.8	4-0.8	8	8/14 5 km	3/5 4 km	0.3833	6.11	7.12	167	4.09
IRM9	286	89	-178	3.0	0.8-0.8	4-0.8	8	4/14 5 km	3/5 4 km	0.3999	5.78	7.11	167	3.99
IRM10	296	89	-178	3.0	0.8-0.8	4-0.8	8	4/14 5 km	3/5 4 km	0.4697	5.17	7.08	172	3.80
IRM11	276	89	-178	3.0	1.5-1.5	4-1.5	8	4/14 5 km	3/5 4 km	0.3653	5.17	7.08	168	5.52
IRM12	276	89	-178	3.0	1.2-1.2	4-1.2	8	4/14 5 km	3/5 4 km	0.3636	8.98	7.24	167	3.49
IRM13	276	89	-178	3.0	1.2-1.2	4-1.2	8	4/15 6 km	3/5 5 km	0.3551	10.08	7.29	172	4.68
IRM14	276	89	-178	3.0	0.8-0.8	4-0.8	8	5/18 4 km	3/6 3 km	0.3588	6.87	7.16	169	5.38
IRM15	276	89	-178	3.0	0.8-0.8	4-0.8	8	5/20 4 km	3/6 3 km	0.3515	7.37	7.18	169	5.42
IRM16	276	89	-178	3.0	0.8-0.8	4-0.8	8	5/17 5 km	3/5 4 km	0.3539	7.15	7.17	167	4.14
IRM17	276	89	-178	3.0	1.2-1.2	4-1.2	8	5/17 5 km	3/5 4 km	0.3487	10.04	7.28	168	5.99
IRM18	276	89	-178	3.0	0.8-0.8	4-0.8	8	6/17 5 km	3/5 4 km	0.3539	9.79	7.26	168	6.07
IRM19	276	89	-178	3.0	0.8-0.8	4-0.8	8	8/17 5 km	3/5 4 km	0.3676	6.61	7.15	170	4.15
IRM20	276	89	-178	3.0	1.2-1.2	4-1.2	8	5/18 4 km	3/6 3 km	0.3575	9.37	7.25	169	7.34
IRM21	276	89	-178	3.0	1.2-1.2	4-1.2	8	5/17 5 km	3/5 4 km	0.3550	8.98	7.24	167	531

## Four Destructive Earthquakes in Türkiye

Model	Strike (°)	Dip (°)	Rake (°)	Vr km/s	SRT (s)	TW-Lag	RD (km)	PSG		Var.	Mo 10 <sup>19</sup> (Nt.m)	Mw	AR (°)	MS (m)
								Along strike	Along depth					
IRM22*	276	89	-178	3.0	1.2-1.2	4-1.2	8	5/17 5 km	3/5 4 km	0.3630	10.0	7.27	170	5.53
IRM23**	276	89	-178	3.0	1.2-1.2	4-1.2	8	5/17 5 km	3/5 4 km	0.3592	10.01	7.27	165	5.31

Vr: Rupture velocity, SRT: Rise-fall durations of slip rise-time function, TW-Lag: number of time window-time lag of the next time window, RD: Reference depth, PSG: reference/number and interval of point sources in point-source grid, Var.: Variance, Mo = Seismic Moment, AR: Calculated average rake angle, MS: maximum slip.  
\* Same as the Model IRM17 but crustal velocity model is from Kahraman et al. (2015). \*\* Same as the Model IRM17 but crustal velocity model is from Zor et al. (2006).

**Table S3.** Inversion trials carried out for the May 22, 1971 Bingöl earthquake. The results are shown for the selected solutions in Fig. S4.

Model	Strike (°)	Dip (°)	Rake (°)	Vr km/s	SRT (s)	TW-Lag	RD (km)	PSG		Var.	Mo 10 <sup>19</sup> (Nt.m)	Mw	AR (°)	MS (m)
								Along strike	Along depth					
IRB1	231	82	3.0	3.0	1.0-1.0	6-1.0	7	3/11 4 km	3/5 3.5 km	0.4017	1.30	6.68	-5	2.95
IRB2	231	82	3.0	3.0	1.0-1.0	6-1.0	10.5	3/11 4 km	4/5 3.5 km	0.4591	1.27	6.67	-6	2.67
IRB3	231	82	3.0	3.0	1.0-1.0	6-1.0	14	3/11 4 km	5/5 3.5 km	0.5686	1.18	6.65	-7	1.90
IRB4	231	82	3.0	3.0	1.0-1.0	6-1.0	7	5/11 4 km	3/5 3.5 km	0.4071	1.19	6.65	-3	2.99
IRB5	231	82	3.0	3.0	1.0-1.0	6-1.0	7	3/11 5 km	3/5 4 km	0.3956	1.36	6.69	-7	2.35
IRB6	231	82	3.0	3.0	0.8-1.5	6-1.5	7	3/13 3 km	3/6 2.5 km	0.3657	1.44	6.71	-5	2.96
IRB7	231	82	3.0	3.3	0.8-1.5	6-1.5	7	3/13 3 km	3/6 2.5 km	0.3716	1.42	6.70	-4	2.84
IRB8	231	82	3.0	3.5	0.8-1.5	6-1.5	7	3/13 3 km	3/6 2.5 km	0.3711	1.43	6.70	-3	2.89
IRB9	231	82	3.0	2.7	0.8-1.5	6-1.5	7	3/13 3 km	3/6 2.5 km	0.3728	1.41	6.70	-6	3.08
IRB10	231	82	3.0	2.5	0.8-1.5	6-1.5	7	3/13 3 km	3/6 2.5 km	0.3734	1.44	6.70	-5	3.32
IRB11	226	86	12.0	3.0	0.8-1.5	6-1.5	7	3/13 3 km	3/6 2.5 km	0.3925	1.49	6.71	-1	3.28
IRB13*	231	82	3.0	3.0	0.8-1.5	6-1.5	7	3/13 3 km	3/6 2.5 km	0.4086	1.36	6.69	-8	3.19

Vr: Rupture velocity, SRT: Rise-fall durations of slip rise-time function, TW-Lag: number of time window-time lag of the next time window, RD: Reference depth, PSG: reference/number and interval of point sources in point-source grid, Var.: Variance, Mo = Seismic Moment, AR: Calculated average rake angle, MS: maximum slip.  
\*Same as the Model IRB6 but crustal velocity model is from Zor et al. (2003).

**Table S4.** Inversion trials carried out for the September 9, 1975 Lice earthquake. The results are shown for the selected solutions in Fig. S5.

Model	Strike (°)	Dip (°)	Rake (°)	Vr km/s	SRT (s)	TW-Lag	RD (km)	PSG		Var.	Mo 10 <sup>19</sup> (Nt.m)	Mw	AR (°)	MS (m)
								Along strike	Along depth					
IRL1	254	54	40.0	3.0	1.0-1.0	5-1.0	15	3/10 4 km	4/5 4 km	0.2730	0.70	6.50	21	1.02
IRL2	254	54	40.0	3.0	1.0-1.0	5-1.0	12	3/10 4 km	4/5 4 km	0.2220	0.79	6.53	19	0.83
IRL3	254	54	40.0	3.0	1.0-1.0	5-1.0	10	3/10 4 km	3/5 4 km	0.2046	0.89	6.57	21	0.82
IRL4	254	54	40.0	3.0	1.0-1.0	5-1.0	7	3/10 4 km	2/5 4 km	0.1887	0.92	6.58	27	0.90
IRL5	254	54	40.0	3.3	1.0-1.0	5-1.0	7	3/10 4 km	2/5 4 km	0.1904	0.91	6.57	26	0.86
IRL6	254	54	40.0	3.5	1.0-1.0	5-1.0	7	3/10 4 km	2/5 4 km	0.2013	0.89	6.57	25	0.79
IRL7	254	54	40.0	2.7	1.0-1.0	5-1.0	7	3/10 4 km	2/5 4 km	0.1911	0.97	6.59	27	1.00
IRL8	254	54	40.0	2.5	1.0-1.0	5-1.0	7	3/10 4 km	2/5 4 km	0.1924	0.95	6.59	27	1.07
IRL9	254	54	40.0	3.0	0.8-0.8	5-0.8	7	3/10 4 km	2/5 4 km	0.1839	0.90	6.57	30	0.65
IRL10	254	54	40.0	3.0	0.5-0.5	5-0.5	7	3/10 4 km	2/5 4 km	0.1916	0.21	6.15	28	0.23
IRL11	254	54	40.0	3.0	1.5-1.5	5-1.5	7	3/10 4 km	2/5 4 km	0.2072	0.69	6.49	25	0.85
IRL12	254	54	40.0	3.0	0.8-0.8	5-0.8	7	3/10 5 km	2/5 5 km	0.1830	1.02	6.61	28	0.58
IRL13	254	54	40.0	3.0	0.8-0.8	5-0.8	7	3/14 3 km	3/7 3 km	0.1738	1.03	6.61	28	0.78
IRL14	244	54	40.0	3.0	0.8-0.8	5-0.8	7	3/14 3 km	3/7 3 km	0.1684	0.97	6.59	31	0.75
IRL15	242	58	27.0	3.0	0.8-0.8	5-0.8	7	3/14 3 km	3/7 3 km	0.1690	0.94	6.58	27	0.75
IRL16*	244	54	40.0	3.0	0.8-0.8	5	7	3/14 3 km	3/7 3 km	0.1881	1.09	6.62	32	0.83

Vr: Rupture velocity, SRT: Rise-fall durations of slip rise-time function, TW-Lag: number of time window-time lag of the next time window, RD: Reference depth, PSG: reference/number and interval of point sources in point-source grid, Var.: Variance, Mo = Seismic Moment, AR: Calculated average rake angle, MS: maximum slip.  
\* Same as the Model IRL14 but crustal velocity model is from Zor et al. (2003).